Detection of density jump in laser -induced shock-wave plasma using rainbow refractometer

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Abstrak

A special interferometric technique with high sensitivity has been devised on the basis of rainbows refractometer without the use of an additional and delicate amplitude-splitting setup. This new technique was use for the characterization of shock wave plasma induced by a Q-sw Nd-YAG laser on various kinds of metal samples under reduced gas pressures. An unmistakable signal of density jump was detected simultaneously with the emission front signal. It is proved that at the initial stage of the secondary plasma expansion, the front of the emission and the front of the blast wave was coincide and move together with time. However, at a later stage, the front of the emission will separate from that of the blast wave induced in the surrounding gas at low pressures. Using Cu and Zn samples, the experimental result showed that the separation of the emission front and blast wave front took place at 4 mm above sample surface for the laser energy of 140 mJ.